Project partners

- Universidad Autónoma de Madrid (UAM)
- Radboud Universiteit (SRU)
- Consejo Superior de Investigaciones Científicas (CSIC)
- Syddansk Universitet (SDU)
- IBM Research Europe – Zurich (IBM)
- accelopment Schweiz AG (accelCH)

CORENET team at the first General Assembly meeting, hosted by IBM Research Europe – Zurich, May 2022

CORENET Facts and Figures

CORENET is an EU-funded Horizon Europe Research and Innovation Project:

Consortium: Involves 6 partners from 4 countries
Coordinator: Prof. Andrés de la Escosura, Universidad Autónoma de Madrid (UAM), Spain
Budget: 3 million euro
Duration: 01.04.2022 – 31.03.2026

Learn more about the CORENET project

European Innovation Council

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Innovation Council and SMEs Executive Agency (EISMEA). Neither the European Union nor the granting authority can be held responsible for them.

CORENET

Complex chemical reaction networks for breakthrough scalable reservoir computing

https://corenet-horizon.eu

CORENET

Making powerful molecular computers a reality

The underlying idea of CORENET is to use the potential of complex reaction networks (CRNs) to create a chemical reservoir computing (RC) system in which molecules are generated as a result of high-level computations performed by molecular ensembles left to freely react within a microfluidic device.

The implementation of material computing using chemical reactions has long been postulated but never realised, mostly because the underlying chemistry needs to be executed in the most reproducible manner, which can only be achieved with the best-performing reactor hardware.

In such a way, CORENET will lay the foundations for a new era in the chemical sciences with scalable and energy-efficient systems that can directly interface with living organisms.

Objectives

Among the objectives, the multidisciplinary team identified 3 interrelated scientific and technological objectives:

- to explore reaction patterns (e.g., feedback loops and autocatalytic subsets/cycles) in CRNs and establish parallels with the mechanisms of metabolic regulation, thermal homeostasis and biological oscillations

- to integrate the recurrent reaction networks developed previously into a microfluidic flow system that provides full control over input variables and interfaces with analytical equipment to measure the output of such networks and further develop suitable interfaces with Gas chromatography and Liquid chromatography–mass spectrometry analytical methods

- to deploy the CRNs developed together with their automated on-chip operation and product analytics for computing purposes

Impact

The impact of the CORENET project reaches far and beyond the specific research areas of its consortium.

In the long-term vision, the research findings are expected to have potential impact covering all the main key impact pathways highlighted below:

Scientific

- New knowledge bridging systems chemistry, microfluidics technology and computer science

Societal

- Personalised patient treatment via in situ synthesis of drug molecules
- Cheaper drug discovery and patient treatment

Economic/ Technological

- Chemical reservoir computing devices that work at net-zero computational power, enabling truly sustainable and green AI

Research & Innovation